

Original
articleSexually transmitted infections among HIV
seropositive men and women

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Objectives: To determine the prevalence of identified STIs and recognised symptoms of STIs and their association with health status, substance use, and sexual risk behaviour in a sample of HIV seropositive men and women.

Methods: 223 men, 112 women, and five transsexual people living with HIV infection completed confidential surveys. Participants were recruited through community based services, community health clinics, and snowball (chain) recruitment techniques in Atlanta, GA, USA in December 1999.

Results: We found that (263) 78% of participants had been sexually active in the previous 3 months. For the entire sample, 42 (12%) participants reported an STI in the past 3 months and 40 (11%) experienced symptoms of an STI without indicating a specific diagnosis in that time. Gonorrhoea, chlamydia, syphilis, and newly diagnosed herpes simplex virus (HSV) were identified at similar rates among men, whereas trichomonas, gonorrhoea, and newly diagnosed HSV occurred most often in women. STIs were associated with substance use in men and women, with “crack” cocaine users having the greatest likelihood of an STI relative to non-crack users. STIs were also associated with continued practice of sexual risk behaviours.

Conclusions: This sample of people living with HIV-AIDS reported high rates of diagnoses and symptoms of STIs. There were significant associations between STIs, substance use, and continued high risk sexual practices in men and women. These findings support the need for studies that confirm prevalence of STIs using clinical laboratory tests.

(*Sex Transm Inf* 2000;76:350–354)

Keywords: HIV; sexual risk; HIV transmission

Introduction

We report the prevalence and correlates of self reported sexually transmitted infections (STIs) in a sample of HIV infected men and women. HIV infection is most frequently transmitted through unprotected anal and vaginal intercourse with an HIV infected partner. In addition, individuals who are unaware of their own HIV infection unknowingly transmit the virus to others during unprotected sex acts. As many as one in three HIV infected people continue to practise unprotected anal and vaginal intercourse after knowing that they are HIV positive, and unprotected sex often occurs with unknown serostatus or known HIV negative partners.^{1–3} Several STI epidemics are well documented in populations at risk for HIV,^{4–5} suggesting that STIs may also be prevalent in HIV infected people who continue to practise sexual risk behaviours. In addition, previous research has shown rates of incident STIs in people living with HIV infection that vary from 15% to 25%, depending on time intervals and inclusion criteria.^{6–8} STIs are known to complicate the course of HIV disease progression and facilitate HIV transmission during unprotected sex acts.^{9–10} Estimating the prevalence of STIs in HIV seropositive men and women can therefore provide important information for screening people with HIV-AIDS for STIs, targeting and planning interventions to reduce the spread of HIV, and forecasting trends in HIV infections. Towards this end, we report the point prevalence of identified STIs as deter-

mined by self reporting in a community recruited sample of HIV infected men and women. We also examined demographic characteristics, health status markers, alcohol and other drug use, and sexual practices among HIV positive men and women with self reported STIs.

Methods

PARTICIPANTS

Study participants were 223 (66%) men, 112 (33%) women, and five (1%) transsexuals. Because of the small number of transsexuals who had not undergone male to female sexual reassignment, we combined these participants with males for all further analyses. All participants were fluent English speakers.

PROCEDURES

Men and women were recruited from AIDS service organisations, healthcare providers, social service agencies, community residences for people living with HIV-AIDS, and infectious disease clinics in Atlanta, GA, USA, in December 1999. Flyers announcing the study opportunity were put in these locations and providers were asked to refer clients to participate in a 9 month prospective cohort study of HIV sexual transmission risk behaviour in people living with HIV-AIDS. Interested people phoned the research programme offices using a toll-free number to schedule an appointment to participate. Individuals were told that they would be asked to complete a confidential

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Accepted for publication
18 July 2000

survey and interview concerning their health and sexual behaviours. Participants were informed that their HIV status would need to be verified by presenting a photo ID and proof of their HIV status (for example, HIV positive test result, HIV clinic card, or HIV medication prescription bottle). Participants completed informed consent in accordance with IRB guidelines, followed by an assessment of reading ability and the study measures. Participants who either demonstrated difficulty on a reading literacy test, or were unable to read the written survey, or who requested assistance were interviewed to complete all study measures. Participants were given \$30 and were asked to tell their friends and other people they knew who have HIV about the study to increase word of mouth recruitment.

MEASURES

Participants completed all study measures in a single session that consisted of: (1) demographic and health characteristics; (2) occurrences of STIs and STI symptoms; (3) substance use; and (4) sexual behaviours. Measures were self administered except for participants who experienced difficulty reading or requested assistance, for which measures were administered in an interview.

Demographic and health status

Participants were asked their age, years of education completed, income level, and their self identified sex, ethnicity, and sexual orientation. We also asked what month and year participants tested HIV seropositive, whether they had experienced each of 15 HIV related symptoms (including persistent respiratory problems, skin rashes, digestive problems, recurring fever, and fatigue), whether they had been diagnosed with an AIDS case defining condition, the number of times they have been hospitalised for HIV-AIDS related conditions, and whether they had been treated for mental health problems. We also asked participants whether they had been diagnosed with an AIDS related condition, and if so which diagnoses they had received. Participants also self reported their most recent T cell (CD4) count with cells coded as over and under 200 cells $\times 10^6/l$ —the clinical criteria for AIDS, and viral load, with <400 copies/ml coded as undetectable.

Sexually transmitted infections

We asked participants whether they had ever been treated for a sexually transmitted infection in order to obtain an estimate of lifetime STI prevalence. Participants also indicated whether they had been diagnosed with any of six STIs in the previous 3 months (90 days from the date of the assessment) and whether they had experienced any of three symptoms associated with STIs. Responses were used to group participants into those who had and had not experienced an STI or symptoms of an STI in previous 3 months.

Substance use

Participants were asked if they had used alcohol, marijuana, powder and “crack” cocaine, and injection drugs, or any other drugs in the previous 3 months. Responses to these items were coded for no use, use at least once a month, and use at least once a week.

Sexual risk practices

Participants were asked to report the number of times they had engaged in anal and vaginal intercourse without and with condoms in the past 3 months. We were particularly interested in unprotected anal and vaginal intercourse because of the high risk that these behaviours pose for HIV transmission. We also calculated the proportion of intercourse occasions protected by condoms using the formula (protected acts)/(total acts). Participants also recorded the number of sexual partners with whom they had engaged in each behaviour in the previous 3 months. Open response formats were used for the sexual behaviour measures to reduce response bias and to minimise measurement error.¹¹ Measures similar to these have been found reliable.¹²

STATISTICAL ANALYSES

Participants were placed in one of three groups for comparisons (a) people who reported any STI or symptom of an STI in the previous 3 months; (b) sexually active people who did not report an STI or symptom of an STI in the previous 3 months; and (c) participants who were not sexually active in the past 3 months. Comparisons for demographic, health status, and substance use were performed using contingency table χ^2 tests for nominal and ordinal data and one way analyses of variance (ANOVA) for continuous measures with planned comparisons conducted using least significant difference tests. For comparisons on measures of sexual behaviours, participants who reported an STI or STI symptoms were compared with individuals who did not report STIs using independent t tests. Sexual behaviour variables were transformed to correct for extremely skewed distributions using the formula $\log_{10}(X+1)$, with observed values presented in the table. All statistical analyses used two tailed tests with $p < 0.05$. Univariate comparisons for substance use behaviours were followed by multiple logistic regression analyses for people reporting and not reporting an STI across sexes because the use of multiple substances was common in our sample.

Results

The majority of the sample was African-American (79%), with 19% white participants, 2% Hispanic/Latino. Most participants (86%) had annual incomes of less than \$20 000. The mean age was 40.2 (SD 7.3, range 22–69), and the mean number of years of education was 12.7 (2.2), with 23% of participants reporting less than 12 years of education. Participants were aware of their HIV status for an average of 7.6 (4.8) years and had been hospitalised an average of 1.3 (1.8) times with an HIV associated condition. The mean CD4 cell count was

Table 1 STI diagnoses and symptoms among men and women living with HIV-AIDS

STI diagnoses and symptoms	Men (n=228)		Women (n=112)		Total (n=340)	
	No	%	No	%	No	%
Diagnoses						
Gonorrhoea	9	4	7	6	11	3
Chlamydia	6	3	4	4	10	3
NGU	1	>1	1	>1	2	>1
Trichomonas	2	1	10	9	12	4
Syphilis	6	3	4	4	10	3
New HSV diagnosis	7	3	7	6	14	4
Any STI	24	11	18	16	42	12
Symptoms						
Unexplained genital discharge	5	2	19	17	22	6
Painful urination	18	8	12	11	30	9
Genital ulcer	11	5	10	9	21	6
Any STI symptoms	29	13	35	31	64	19
Any STI diagnosis or symptom	42	18	40	36	82	24

423.1 $\times 10^6/l$ (634.9); 91 (27%) participants indicated that their viral load was undetectable at most recent testing and 237 (69%) had either been diagnosed with an AIDS related condition or had a CD4 count under 200 cells $\times 10^6/l$.

PREVALENCE OF STIs

For the entire sample, 42 (12%) participants reported an STI in the past 3 months and 40 (11%) experienced symptoms of an STI without indicating a specific diagnosis in that time. Therefore, a total of 82 (24%) participants were defined as having an STI or symptoms of an STI in the previous 3 months. Rates of specific STIs and STI symptoms for men and women are shown in table 1. Among men, gonorrhoea, chlamydia, syphilis, and newly diagnosed HSV were the most commonly reported STIs. Among women, trichomonas, gonorrhoea, and newly diagnosed HSV were most commonly identified. Symptoms of STIs were also reported differentially for men and women, with men most often reporting painful urination and women most often reporting an unexplained genital discharge. Analyses showed that women were significantly more likely than men to report an STI or STI symptom in the previous 3 months, χ^2 (df = 1, n = 340) = 12.27, $p < 0.001$.

Comparisons of people reporting a recent STI, people who were sexually active but not reporting an STI, and people who were not sexually active on demographic and health sta-

tus characteristics showed significant differences for years of education, F (2, 336) = 3.9, $p < 0.05$, and age, F (2, 336) = 8.1, $p < 0.001$. Planned comparisons showed that people with STIs were less educated than their sexually active counterparts and younger than people who were not sexually active. Among men and women there were also differences between groups in incomes under \$20 000 per year, but the differences were small and of limited practical significance. No other differences between groups were significant (see table 2).

SUBSTANCE USE AND STIs

Analyses showed that men who had recently had an STI were significantly more likely to have used powder forms of cocaine, χ^2 (df = 4, n = 223) = 13.7, $p < 0.01$, crack cocaine, χ^2 (df = 4, n = 223) = 14.3, $p < 0.01$, and use of any non-alcoholic drug in the past 3 months, χ^2 (df = 2, n = 224) = 10.1, $p < 0.01$, compared with men who did not have an STI. Among women, having had an STI was not associated with the use of any single type of drug, although women who reported a recent STI were significantly more likely to have used non-alcoholic drugs in the past 3 months, χ^2 (df = 2, n = 112) = 22.9, $p < 0.01$. Collapsing across sexes, people with a recent STI were significantly more likely to use powder forms of cocaine, χ^2 (df = 4, n = 335) = 13.9, $p < 0.01$, crack cocaine, χ^2 (df = 4, n = 337) = 16.9, $p < 0.01$, and any non-alcoholic drug, χ^2 (df = 2, n = 336) = 11.6, $p < 0.01$, compared with people who did not have an STI (see table 3). When all of the individual substance use variables were included in a multiple logistic regression analysis, only use of crack cocaine predicted having had an STI, OR = 1.6, 95% CI = 1.1–2.6.

SEXUAL RISK BEHAVIOURS

Analyses showed that men who had recently had an STI engaged in significantly more unprotected vaginal intercourse, t (226) = 2.9, $p < 0.01$, significantly more unprotected anal intercourse, t (226) = 2.2, $p < 0.05$, and significantly less condom use during anal intercourse, t (95) = 1.97, $p < 0.05$, than men who did not have an STI. For women, analyses failed to show any significant differences

Table 2 Demographic and health characteristics of men and women living with HIV-AIDS and diagnoses or symptoms of an STI in the past 3 months

	Men							Women							p ^a
	Not sexually active (n=61)		Sexually active no STI (n=124)		Sexually active with STI (n=42)		p	Not sexually active (n=26)		Sexually active no STI (n=46)		Sexually active with STI (n=40)		p	
	No	%	No	%	No	%		No	%	No	%	No	%		
Ethnic minority	49	80	90	73	35	83	ns	24	92	44	96	34	85	ns	ns
Income <\$20 000	56	92	96	78	37	88	0.05	24	92	37	82	40	100	0.01	0.01
Sexual orientation															
Homosexual	33	54	79	64	25	61		3	12	7	15	1	3		
Bisexual	7	12	16	13	5	12		3	12	3	7	3	8		
Heterosexual	21	34	29	23	11	72	ns	20	77	36	78	34	90	ns	ns
AIDS diagnosis	41	84	81	83	32	91	ns	21	88	29	78	33	92	ns	ns
	Mean	SD	Mean	SD	Mean	SD		Mean	SD	Mean	SD	Mean	SD		
Age	41.9	6.8	40.4	7.4	38.3	6.8	0.05	41.4	8.6	39.7	6.9	38.8	7.2	ns	0.01
Education	12.8	2.1	13.4	2.3	12.2	2.0	0.01	11.7	1.8	12.5	2.2	11.7	2.4	ns	0.01
Years HIV positive	7.8	5.5	7.9	4.6	7.8	5.3	ns	4.9	2.8	6.8	4.5	7.6	4.4	0.05	ns
CD4 count (×10 ⁶ /l)	368	374	400	482	282	339	ns	448	312	498	256	629	1584	ns	ns
Log viral load	3.6	2.1	3.4	1.8	4.0	1.4	ns	3.3	2.2	2.5	2.1	2.8	2.2	ns	ns

p for differences within sex groups and p^a for differences between STI groups collapsing across sexes.

Table 3 Substance use among men and women living with HIV-AIDS and diagnoses/symptoms of an STI in the past 3 months

	Men						Women							
	Not sexually active (n=61)		Sexually active no STI (n=124)		Sexually active with STI (n=42)		Not sexually active (n=26)		Sexually active no STI (n=46)		Sexually active with STI (n=40)		p	p ^a
	No	%	No	%	No	%	No	%	No	%	No	%		
Alcohol														
None	32	52	47	38	17	41	21	80	33	72	21	54		
Monthly	12	20	27	22	8	18	4	15	6	13	6	15		
Weekly	17	28	50	40	17	41	1	5	7	15	12	31	ns	ns
Marijuana														
None	47	78	84	68	31	76	24	92	44	96	31	80		
Monthly	5	8	17	14	3	7	0		0		2	5		
Weekly	8	14	22	18	7	17	2	8	2	4	6	15	ns	ns
Powder cocaine														
None	51	86	98	80	30	73	25	96	44	96	35	87		
Monthly	5	9	15	12	1	3	0		1	2	1	3		
Weekly	3	5	10	8	10	25	1	4	1	2	4	10	ns	.01
Crack cocaine														
None	53	88	96	78	29	69	24	92	42	91	29	73		
Monthly	2	4	10	8	0		0		1	2	2	5		
Weekly	5	8	17	14	13	31	2	8	3	7	9	22	.01	.01
Injection drugs														
None	60	98	121	97	41	98	26	100	46	100	39	99		
Monthly	1	2	2	2	0		0		0		1	1		
Weekly	0		1	1	1	2	0		0		0			ns
Any non-alcohol drug	16	27	64	52	18	43	3	12	4	9	20	50	.01	.01

p for differences within sex groups and p^a for differences between STI groups collapsing across sexes.

between women who had an STI and women who did not have an STI in the past 3 months on any of the sexual risk behaviours. Collapsing across sexes, people with a recent STI reported significantly more unprotected vaginal intercourse, $t(336) = 3.3$, $p < 0.001$, more condom protected vaginal intercourse, $t(337) = 2.2$, $p < 0.05$, more total acts of vaginal intercourse, $t(337) = 3.5$, $p < 0.01$, and significantly less condom use during anal intercourse, $t(104) = 2.2$, $p < 0.05$, than people who did not have an STI (see table 4).

Discussion

This study found that 12% of HIV infected people reported having an STI in the previous 3 months and an additional 11% reported symptoms possibly indicating an STI without an STI diagnosis. This point prevalence estimate of STIs among men and women living with HIV-AIDS is, however, limited by the study reliance on self reported diagnoses and self reported symptoms. Undetected STIs are common, particularly among women, suggesting that our methodology may have underestimated the actual prevalence of STIs. Also, self reported STIs can be underestimated as a result of social response biases,¹¹ suggesting that our results represent a lower bound point

estimate of STI prevalence in people living with HIV-AIDS. The current study findings should therefore be considered preliminary and in need of confirmatory research using clinical and laboratory screening methods for diagnosing STIs. Another study limitation was our lack of information regarding recent use of antibiotics for treating and preventing opportunistic infections, as these treatments will also affect some STIs. In addition, our study was limited by our failing to identify the HIV status of participants' sex partners, a factor essential to estimating risks for new HIV infections.

Findings from the current study strongly indicate the need for confirmatory research using biological testing for STIs in community samples of people living with HIV-AIDS. Results showed that substance use, particularly crack cocaine use, might be a marker for STI risk in HIV positive people. Across sexes, individuals who had used crack cocaine in the previous 3 months were nearly twice as likely to have had an STI or symptoms of an STI relative to people who did not have an STI or symptoms. Our findings also indicated higher rates of unprotected vaginal intercourse, protected vaginal and anal intercourse, and less proportional use of condoms during anal intercourse among people living with HIV-AIDS

Table 4 Sexual practices among men and women living with HIV-AIDS and diagnoses or symptoms of an STI in the past 3 months

	Men					Women					
	No STI (n=186)		STI (n=42)		p	No STI (n=72)		STI (n=40)		p	p ^a
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		
Unprotected vaginal intercourse	0.5	2.3	3.2	11.9	0.03	3.4	13.2	5.0	10.6	ns	0.01
Vaginal intercourse with condoms	1.0	5.7	1.1	2.8	ns	2.9	7.9	5.6	16.7	ns	0.03
Total vaginal intercourse	1.5	6.3	4.3	12.3	0.06	6.3	14.9	10.6	19.6	ns	0.01
% vaginal protected	64.0	40.1	62.0	41.3	ns	62.6	43.8	56.7	45.1	ns	ns
Unprotected anal intercourse	1.3	3.9	3.8	10.5	.03	0.1	0.4	0.1	0.2	ns	ns
Anal intercourse with condoms	3.9	14.2	3.7	12.4	ns	0.2	0.1	0.1	0.1	ns	ns
Total anal intercourse	5.2	15.2	7.4	22.4	ns	0.2	0.8	0.1	0.4	ns	ns
% anal protected	68.3	34.7	50.6	36.8	0.05	58.3	49.2	33.3	57.7	ns	0.03
Number of partners	2.3	4.4	3.5	8.0	ns	0.8	1.0	1.2	1.9	ns	ns

Note: Numbers represent frequencies for behaviours reported during the past 3 months; p for differences within sex groups and p^a for differences between STI groups collapsing across sexes.

who had an STI or STI symptoms. Consistent with previous research,³ 36% of HIV infected people reported engaging in unprotected intercourse in the previous 3 months. Given the suggested risks for STIs in our sample as well as the risks for transmitting treatment resistant strains of HIV,¹³ there is a need for HIV prevention interventions targeted to people who are already known to be infected with HIV. Interventions that focus on reducing substance use, reinforcing consistent condom use, and enhancing motivation to practise safer sex should be targeted to sexually active people with HIV. Interventions for people already infected but continuing risk practices will probably prove more efficient and cost effective than interventions that only target masses of uninfected people.¹⁴

The authors thank the AIDS Survival Project of Atlanta, James Austin, Webster Luke, Kari DiFonzo, Delores Simpson, Jeff Buckles, Florence Kyomugrsha, and Michael DiMarco for their assistance with data collection. National Institute of Mental Health (NIMH) Grant R01-MH57624 and Center Grant P30 MH52776 supported this research.

Contributors: SCK served as the principal investigator on this study, directing its design, implementation, data analyses, and manuscript preparation; DR served as project coordinator, developing the participant recruitment and sampling scheme, establishing, and implementing study protocols, and interpreting the study findings; MC served as project director, maintaining quality assurance, managing data collection activities, and conceptualising study results.

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